

2920/206

DATABASE MANAGEMENT SYSTEMS

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Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of EIGHT questions.

Answer FIVE of the EIGHT questions on answer booklet provided.

Candidates should answer the questions in English.

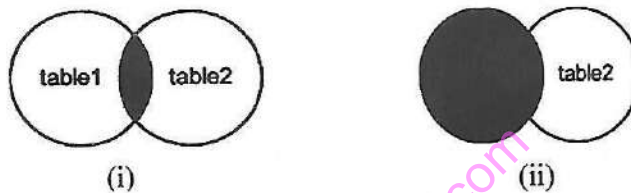
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**This paper consists of 5 printed pages.
Candidates should check the question paper to ascertain that all the
pages are printed as indicated and that no questions are missing.**

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Turn over

- 1 (a) Outline **four** characteristics of a *primary key* in a database. (4 marks)
- (b) Distinguish between *associated record* and *orphan record* as used in a database. (4 marks)
- (c) Describe each of the following terms as used in a database:
- (i) meta data; (2 marks)
- (ii) data dictionary; (2 marks)
- (iii) database instance. (2 marks)
- (d) John, a system analyst, used an entity relationship diagram to design a database. Explain **three** benefits he would derive from the use of this design tool. (6 marks)
- 2 (a) Outline **four** challenges posed by integrating Artificial Intelligence in databases. (4 marks)
- (b) Distinguish between *relational model* and *hierarchical model* as used in database design. (4 marks)
- (c) The following are visual diagrams representing categories of joins in database design. The coloured parts represent the data of concern. Use them to answer the questions that follow.



- (i) Identify the joins used in (i) and (ii). (2 marks)
- (ii) Write structured query language statement for each of the joins in (i) and (ii). (4 marks)
- (d) Figure 1 shows an entity relationship diagram. Use it to answer the questions that follow:

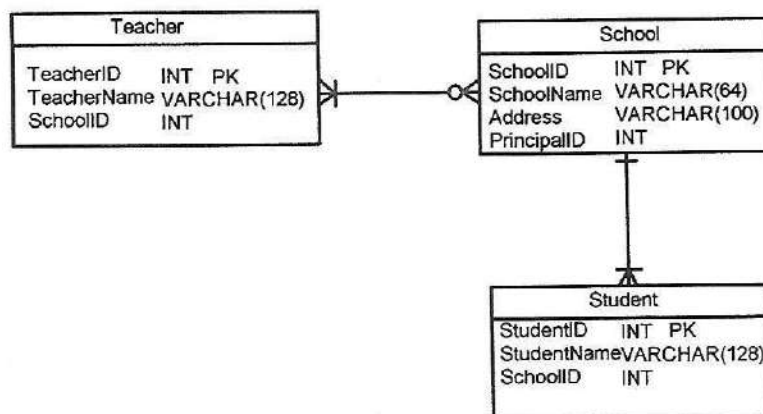


Figure 1

- (i) Explain the function of *varchar (64)* as used in the diagram. (2 marks)
- (ii) Describe **two cardinalities** that have been used in the diagram. (4 marks)
- 3 (a) (i) State the meaning of *null value* as used in a database. (1 mark)
- (ii) Outline **three** circumstances that may lead to the occurrence of a null value in a database. (3 marks)
- (b) With the aid of an example in each case, explain the following quantifiers in a relational algebra:
- (i) existential quantifier;
- (ii) universal quantifier. (4 marks)
- (c) Differentiate between *IN clause* and *Between clause* as used in structured query language. (4 marks)
- (d) The following is a relation considered to be in its 2nd normal form. Use it to answer the question that follows:

Stproject table

StudentID	ProjectID	StudentName	ProjectName
St001	P001	Jared	Student Registration
St002	P002	Jane	Patient Registration
St003	P003	Elias	Road maintenance
St004	P004	Asiba	Library Registration

- (i) Explain **two** reasons why the relation violates the 2NF in normalization. (4 marks)
- (ii) Represent the Stproject relation to its 2nd normal form. (4 marks)
- 4 (a) Outline **four** reasons that can lead to loss of data in a database. (4 marks)
- (b) Outline **three** reasons why a database administrator is required to constantly audit an organisation database. (3 marks)
- (c) John entered data in a database and performed some operations that changed the state of the database. Explain **three** such operations. (6 marks)
- (d) With the aid of a diagram, describe the *three-tier architecture* of a database. (7 marks)
- 5 (a) Outline **four** access privileges that may be granted to a database user. (4 marks)
- (b) State **two** differences between *truncate* and *drop* commands as used in structured query language. (4 marks)

- (c) Explain **three** benefits of using a structured query language to manage data in database. (6 marks)
- (d) State the category of each of the following SQL commands, giving a reason for your answer.
- (i) CREATE
 - (ii) INSERT INTO
 - (iii) ROLLBACK (6 marks)

6. (a) Describe each of the following category of end users in a database environment:
- (i) Parametric; (2 marks)
 - (ii) Sophisticated; (2 marks)
 - (iii) Casual. (2 marks)
- (b) An organisation requires a database designed for their operations. Explain **three** considerations that should be made during this process. (6 marks)
- (c) Tables A and B contains the following details:

Table A

RegNo	Age
1001	19
1002	23
1003	27

Table B

RegNo	Hostel
1001	Lion
1002	Giraffe
1003	Zebra
1004	Ghazel

State the output of each of the following operations when performed on the tables:

- (i) Natural join;
- (ii) Full join;
- (iii) Outer join.
- (iv) Inner join (8 marks)

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- (a) Outline **four** properties of a transaction in a database. (4 marks)
- (b) Distinguish between *sorting* and *indexing* as used in databases. (4 marks)
- (c) Explain **three** types of data protection methods that may be applied in a database management system. (6 marks)
- (d) An organisation intends to use a database management system to support its operations. Explain **three** challenges the organisation may face as a result of using the application. (6 marks)
8. (a) State **four** elements of a database schema. (2 marks)
- (b) Explain **three** disadvantages of flat file approach over relational database approach in respect to data management. (6 marks)
- (c) The following is a relation named *tenant* showing details of tenants in various apartments. Use it to answer the questions that follow:

Tenant_ Lname	Comment	Occupation_ Date	House_ Number	House_ Rent	Apartment_ name
Antony	Paid	17/08/2017	Hse001	30000	Balozi
Leonard		24/06/2019	Hse003	25000	Greenview
Godfrey	Paid	22/02/2018	Hse007	15000	Balozi
Richard		15/04/2016	Hse010	35000	GreenView
Christine	Paid half	14/03/2018	Hse009	25000	GreenView

Write an SQL statement that would display each of the following:

- (i) all records for the latest occupation date in the field named latest_date; (3 marks)
- (ii) average House_rent for all apartments with the name Balozi in the field named avgbalozi; (2 marks)
- (iii) minimum house rent in a field named Lowest_rent; (3 marks)
- (iv) all records with no comment in descending order of house number. (4 marks)

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